FIG. 1A

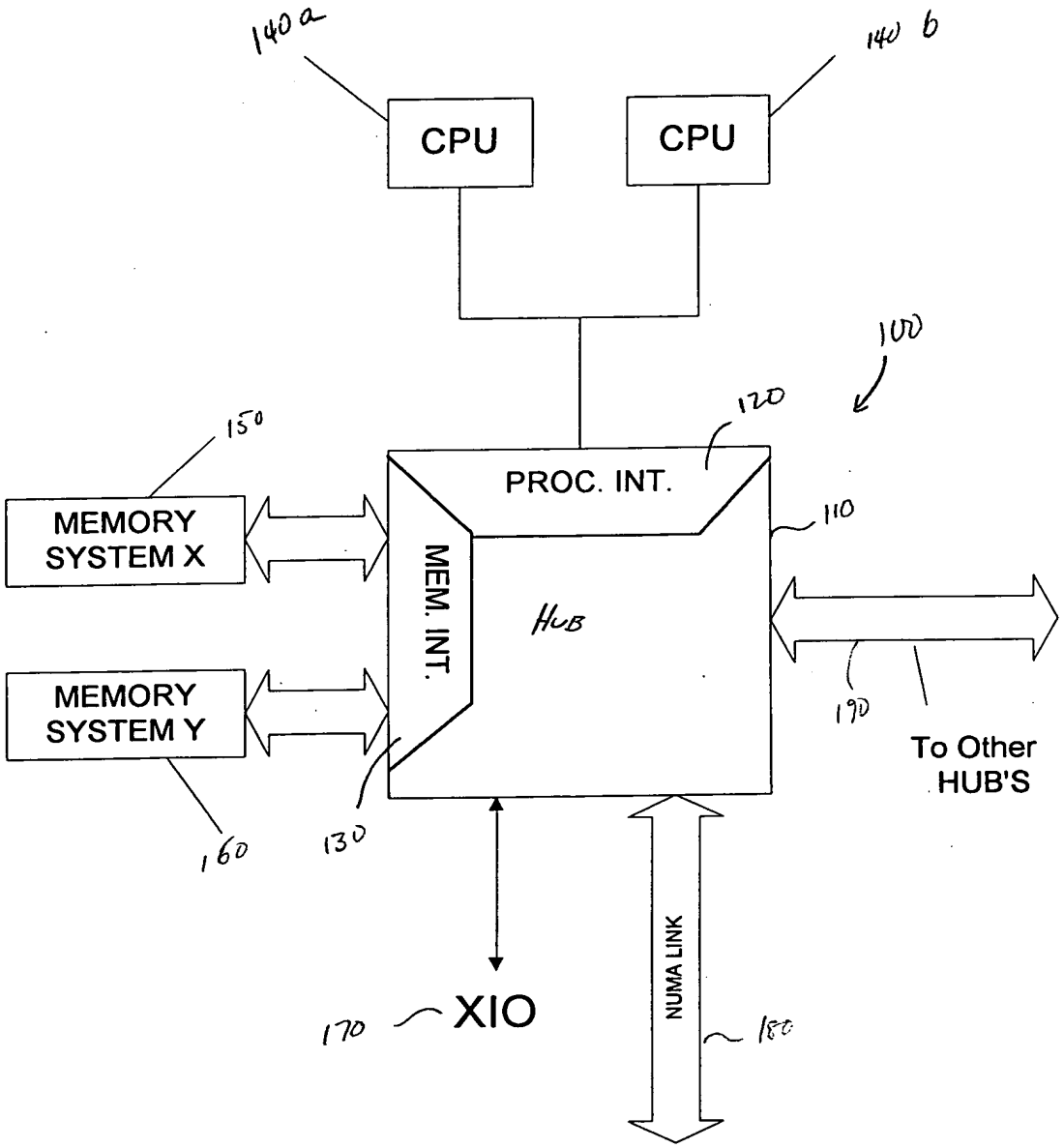
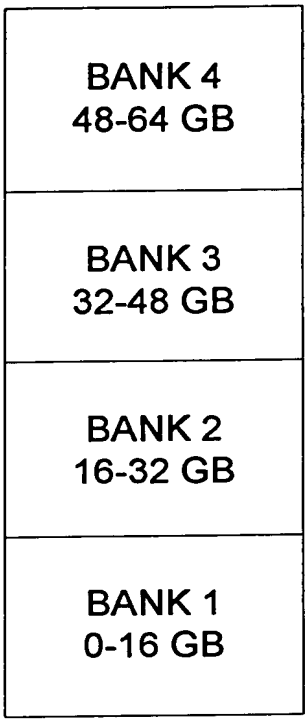

140a
140b
CPU
CPU
100
120
150
PROC. INT.
110
MEMORY SYSTEM X
MEM. INT.
HUB
MEMORY SYSTEM Y
190
To Other HUB'S
160
130
170
XIO
NUMA LINK
180

FIG. 1B



36 BIT MEMORY ADDRESS

BITS 35:34 - BANK SELECT
BITS 33:0 - ADDRESS WITHIN BANK

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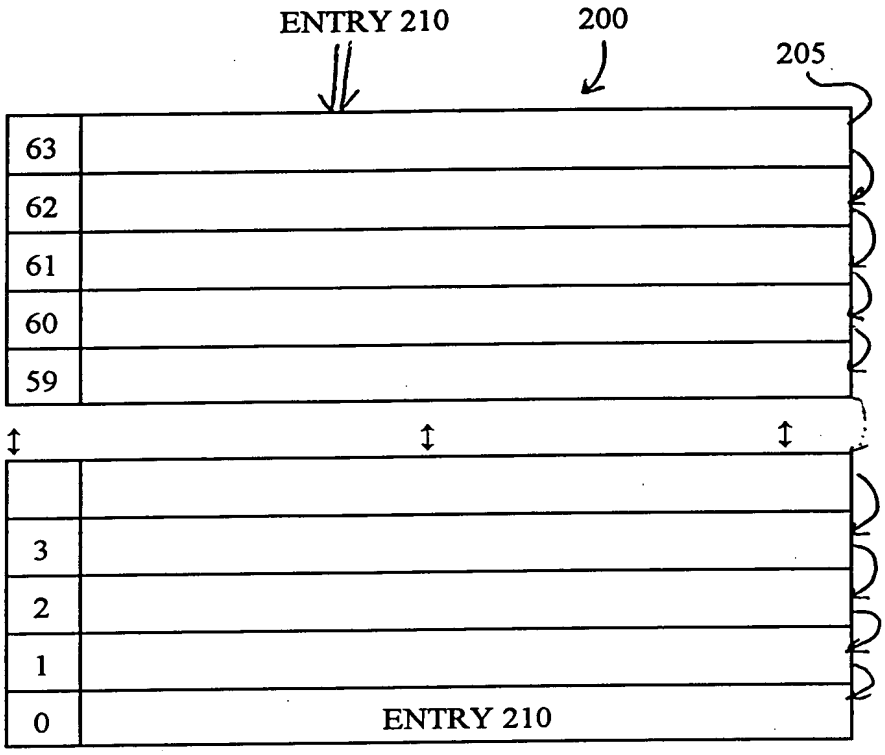
FIG 2A


ENTRY 210
200
205
63
62
61
60
59
3
2
1
0
ENTRY 210

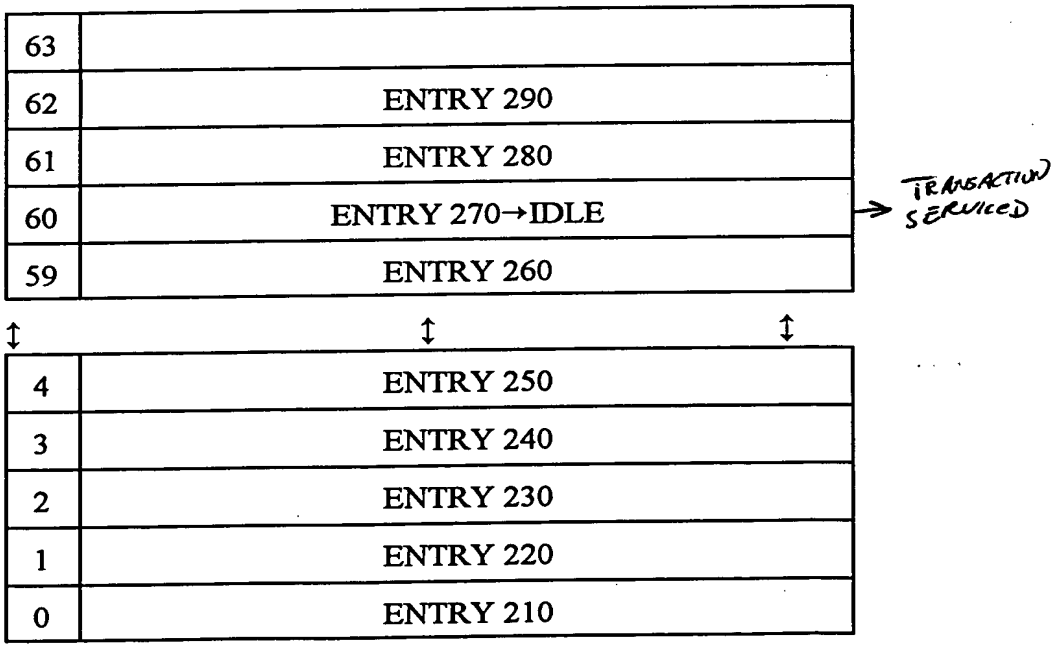

63
62
ENTRY 290
61
ENTRY 280
60
ENTRY 270→IDLE
TRANSACTION SERVICED
59
ENTRY 260
4
ENTRY 250
3
ENTRY 240
2
ENTRY 230
1
ENTRY 220
0
ENTRY 210

FIG. 2B

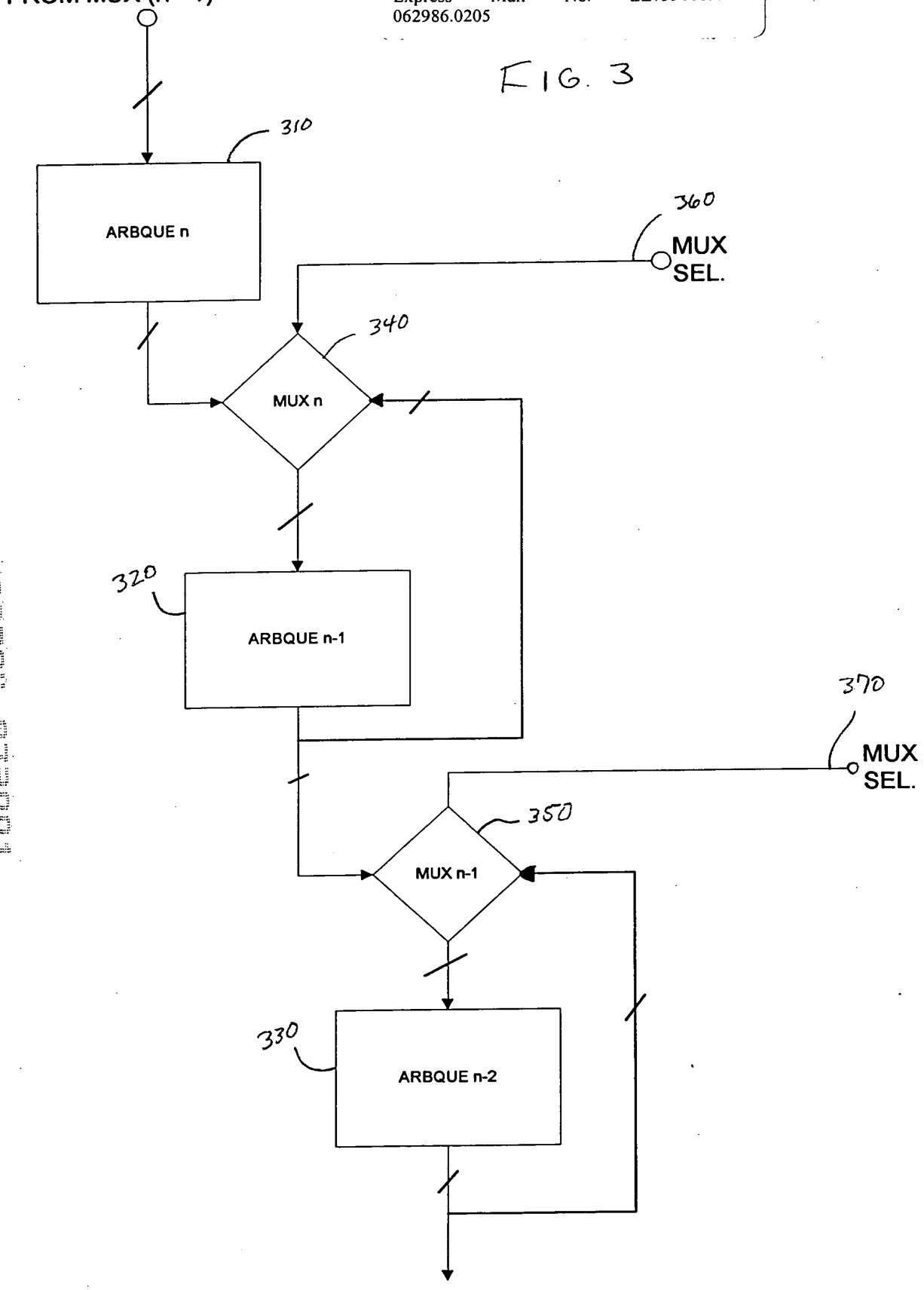
FIG 2C

63	
62	
61	ENTRY 290
60	ENTRY 280
59	ENTRY 260
↕	↕ ↕
4	ENTRY 250
3	ENTRY 240
2	ENTRY 230
1	ENTRY 220
0	ENTRY 210

FIG 4

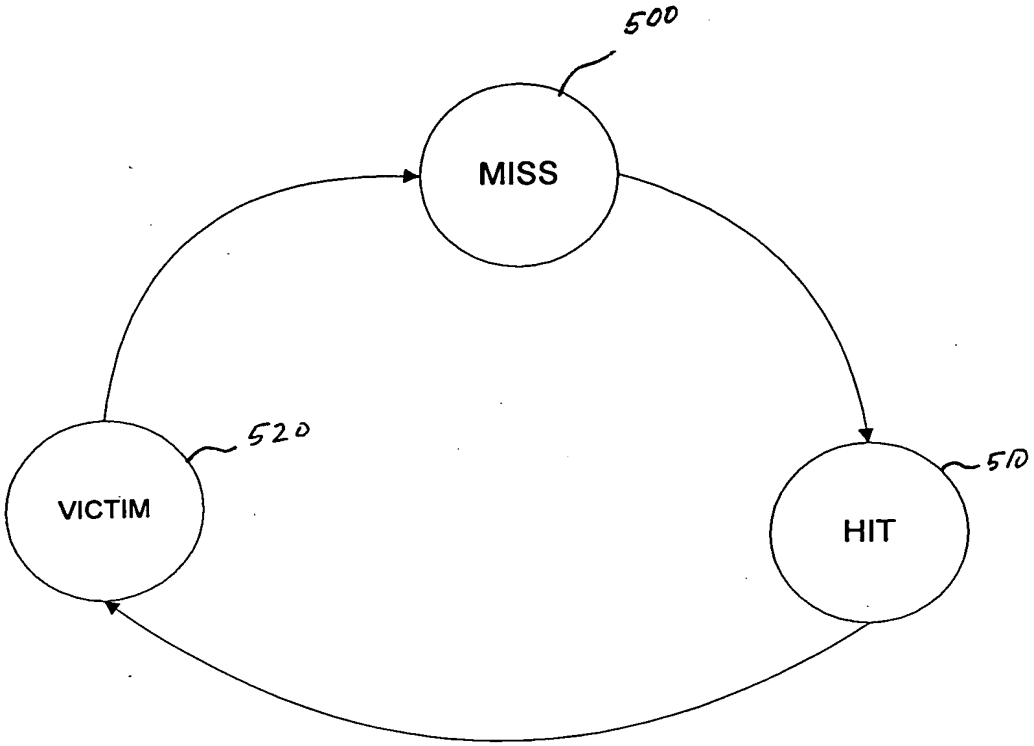
STATE	R/W	CHAIN OK	BANK FREE	OP READY	TRANSACTION
460	450	440	430	420	410

FIG. 3



Express Mail No. EL759108956US

FIG 5



Express Mail No. EL759108956US

FIG. 6

DRAM Direction Arbitration Policy Table

Read (600)	Write (610)	Urgent Write (620)	Follows Read (630)	Follows Write (640)	Direction Threshold (650)	Arbitrate For (660)
x	0	0	x	x	x	Read
0	x	1	x	x	x	Write
0	1	0	1	0	x	Read
0	1	0	0	x	x	Write
1	1	0	x	0	x	Read
1	1	0	0	1	0	Write
1	1	0	0	1	1	Read
1	1	0	0	x	x	Write
1	x	1	0	0	0	Read
1	x	1	1	0	1	Write
1	x	1	1	0	1	Write

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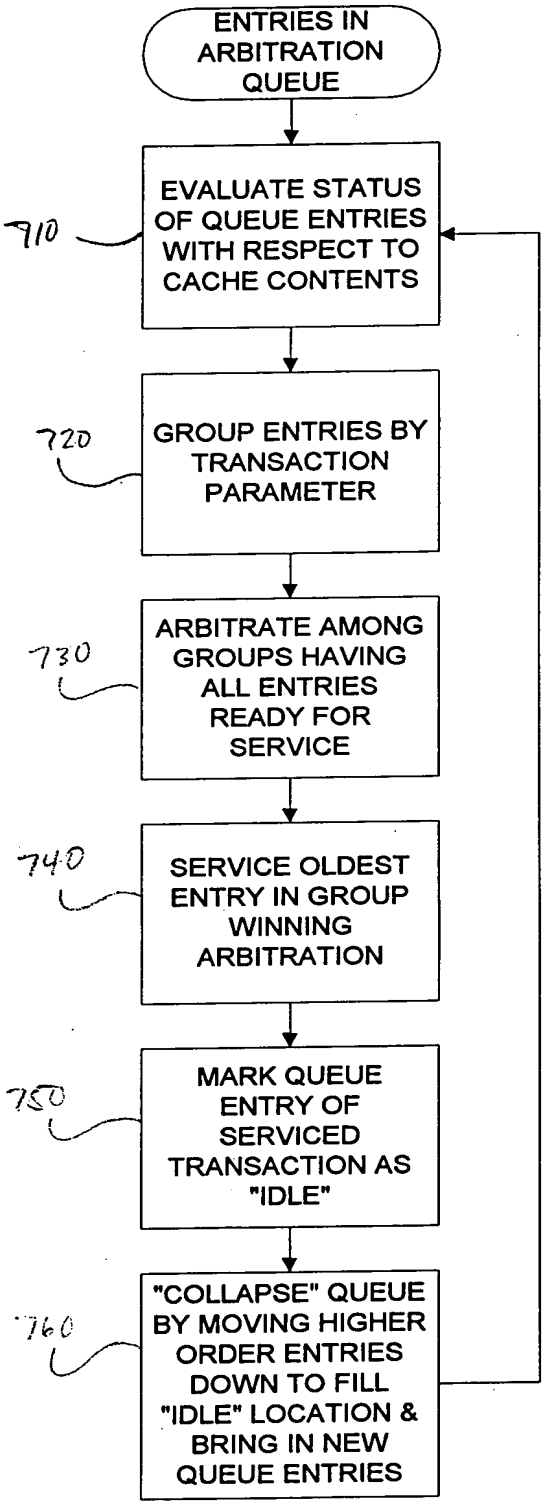
FIG 7



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